

Resilient Power in Schools, Featuring Florida and New Jersey

March 31, 2015

Hosted by

Todd Olinsky-Paul Project Director, Clean Energy Group

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This webinar is being recorded.

You will find a recording of this webinar, as well as previous Resilient Power Project webinars, online at:

www.cleanegroup.org/ceg-projects/resilient-powerproject/webinars/

and at

vimeo.com/channels/resilientpower

www.resilient-power.org

Who We Are



Evolution of a New Clean Energy Strategy to Meet Severe Weather Threats

September 2014



www.resilient-power.org www.cleanegroup.org









www.resilient-power.org

CEG Resilient Power Project

- Goal: significantly increase public/ private investment for clean, resilient power ٠ systems.
- Support state energy agencies in developing resilient power policy and programs. ٠
- Engage city officials to develop resilient power policies/ programs, link to state ٠ energy policies.
- Protect low-income and vulnerable communities; focus on affordable housing ٠
- Technical assistance & targeted support for pre-development costs for resilient ۲ power projects to help agencies/ project developers get deals done.
- See www.resilient-power.org for reports, newsletters, webinar recordings ٠





www.resilient-power.org

POWER

Concept Note

CleanEnergyGroup

Today's Guest Speakers

- John Leeds, Senior Management Analyst, Florida Department of Agriculture and Consumer Services, Office of Energy
- Susan Schleith, Energy Education Coordinator, University of Central Florida, Florida Solar Energy Center
- Avital Szulc, Product Management, A.F. Mensah

We will be joined by Adje Mensah, Peter Mendonez and Drew Adams for the Q&A portion of this webinar.





Office of Energy

Resilient Power in Florida Schools

John Leeds March 31, 2015



Florida Department of Agriculture and Consumer Services • Adam H. Putnam, Commissioner

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Functions & Responsibilities

- Legislatively designated state energy policy development office within Florida
- Evaluate energy related studies, analyses, and stakeholder input
- Promote and advocate for the development and use of renewable energy resources and energy efficiency technologies
- <u>Use available state and federal funds to develop and manage energy</u> <u>efficiency, renewable energy, and energy education programs</u>
- Produce Annual Energy Report



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Program Development

- The Florida Office of Energy (OOE) decided to build on the success of the original SunSmart Schools Program and expand the scope of work to include emergency shelters and battery back up.
- Florida PV Buildings Program at Florida Solar energy Center (FSEC)
 - Complemented Federal Million Solar Roofs (1997)
 - PV on Schools 2003 through 2005
 - Coordinated installation of 29 Grid-connected 4 kW PV systems
 - SunSmart Schools 2006 2007
 - Coordinated installation of 13 Grid-connected 2 kW PV systems and 2 Larger 10 kW Bi-modal systems



Program Development Con't

- Decision was made to provide a grant of \$10 million in American Recovery and Reinvestment Act funding to FSEC based on performance of previous SunSmart Schools Program
 - Significant time and effort went into compliance with Davis Bacon and Buy American Provisions of the American Recovery and Reinvestment Acts funds.
- Florida Department of Emergency Management
 - The OOE worked with the Florida Department of Emergency Management (FDEM) to identify schools and the needs of the shelters to assist in design of the program.



Reasons

- Saving Schools Money on Energy Costs
 - The average cost of electricity across all sectors in Florida is 10.81 cents. This equates to an annual savings of nearly \$200,000 for the entire project or approximately \$1,800 per school.
- Emergency Management
 - Each system is outfitted with battery back-up capabilities because each school acts as a shelter during times of emergency.





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Reasons Con't

- Education
 - Over 450 teachers and facilities managers attended educational workshops.
 - Each school was provided energy education kits. An estimated 30,000 kids have benefited from this program.
 - EnergyWhiz webpage house useful real world data.
- Data Acquisition
 - Each system has been fitted with data monitoring capabilities which can be accessed at <u>http://www.energywhiz.com/</u> which can be incorporated into curricula.
 - Research quality data that provides solar production and storage information from across the entire state.
- Jobs
 - Unemployment in Florida was 3.7% in March 2007 and 10.7% by July 2009
 - Unemployment in U.S. was 4.9% in December 2007 and 9.4% in July 2009
 - Florida TaxWatch Center for Competitive Florida, # 32 August 2009



What we Learned

- Permitting:
 - Every local jurisdiction has different permitting rules and varying degrees of expertise in solar technologies. This project has lead to policy and programmatic discussion about how to alleviate this barrier to solar installations.
- Educating EVERYONE
 - This project had an education component for children, teachers, and facilities managers that was built into it from the start. However, solar technologies are still relatively misunderstood and education should include school officials, district officials, facilities managers, and building inspectors as well.
- Success:
 - Components of this program are still ongoing as utilities have continued to fund Photovoltaic installations and the OOE is developing a problem to distribute educational kits to schools in the state.



What we Learned Con't

- Significant compliance requirements came along with ARRA funds.
 - Davis Bacon compliance was very difficult and time consuming because of all of the counties that were a part of the program.
 - Buy American compliance was also an issue because it was sometime difficult finding the right components that were made in America.
- Another issue was the badge requirements and schedule requirements for each schools and the difficulty of getting in the school to work.
 - Every school district had different requirements for gaining access to the job site. All required some kind of screening and issuance of a badge.
 - Every school had different time constraint for when the contractor was allowed to access the jobsite.



What we Learned Con't

- Data Monitoring:
 - The importance of the data produced by identical systems installed across the state was not realized at the onset of the program. It was deemed important to provide data to the EnergyWhiz webpage for student projects but the research aspect of this information evolved over time. Due to this, all SunSmart Schools received AlsoEnergy data loggers to ensure that the proper data points where collected.





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SunSmart Schools Emergency Shelter (E-Shelter) Program

Susan T. Schleith K-12 Programs Florida Solar Energy Center

www.energywhiz.com or 321-252-9479 or SunSmart@fsec.ucf.edu



A Research Institute of the University of Central Florida

Florida Solar Energy Center



- Type I Research Institute legislated into existence in 1975
- Research Institute of the University of Central Florida
- Research areas:
 - Photovoltaics, Solar Thermal, Hydrogen, Building Efficiency & Alternative Fuel Vehicles





Overview



- Evolution of Sunsmart
- Overview of the E-Shelter Program
- Accomplishments
- Lessons Learned
- Where Do We Go From Here?







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First E-Shelter School - 2007



Middleton High School Hillsborough County



Overview of Sunsmart Schools Emergency (E)-Shelter Program Goals

- Generate Clean Electricity from the Sun
- Provide Power to Critical needs to Emergency Shelters
- Educate students and teachers about Clean Energy Technologies and Careers
- Creates jobs in Florida
- Reduce Green House Gas Emissions











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SEC

Parameters of the Program



- ARRA funded
 - American made okay for solar panels but issue with inverters
 - Outback the only American made bimodal inverter
 - Track and document wages
 - Davis Bacon Requirements





Emergency Management Regions



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School/Shelter Selection

- Online Application Process
- External Review Committee
 - Enhanced Hurricane Protection Area Status
 - Demographics (location, population, etc.)
 - Administrative/school board support
 - Utility support
 - Teacher commitment





Solar Contractor Selection

- Invitation to Bid
- Technical Specifications
- PV System Certified by FSEC Engineers
- Prime Contractor
 - Vergona Bowersox Electric and Engineering
 - Used four solar subcontractors
 - Other contractors
- FSEC coordinated with schools to complete interior wiring of critical loads





Sunsmart E-Shelter PV System

- 10 kW Photovoltaic System
- 25 kWh Battery Back-Up Energy
- 3 Phase Building Electricity
- Utility Grid-Connected
- Net Metering Power
- Data Monitoring
- Ground Mounted Array
- ~1000 Square feet area





Basic Components of a PV System



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Shelter Critical Loads



PV System Details



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555





Douglas L. Jamerson, Jr. Elem, Pinellas County



Sun Smart E-Shelter

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SunSmart E-Shelter Program Website

www.EnergyWhiz.com

Student & Teacher page Links to data monitoring for each school Science Fair Information Activities, Lessons and Events





EnergyWhiz Connecting Schools, Teachers and Students with Solar Energy.



Innovation Education

The EnergyWhiz Olympics is all about clean energy and creative kids. Each year, on the first Saturday in May, hundreds of students converge at the Florida Solar Energy Center in Cocoa, Florida to participate in renewable energy themed events.

Take a look at our Energy Whiz video and see for yourself.



EnergyWhiz Olympics

Featured Story

Energy Matters

The video at the link below provides a brief yet effective look at energy's role in making our world function. It can be used as an overview, introduction or summary lesson and is less than five minutes in length.

http://www.energy.gov/eere/education/videos/teded-video-guide-energy-earth

About Us



The SunSmart Schools Program has worked to increase the deployment of solar energy systems to Florida schools and colleges, which has been funded through several grant awards.

The SunSmart E-Shelter Program provides 10kW photovoltaic systems with battery back-up to schools that are designated as emergency shelters.

Solar System Performance Data of Florida SunSmart E-Shelter Schools

Select A School	Ŧ
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Calcot A County	
Select A County	

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Select A Utility

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Fri, Mar 27 High: 82 °F

Low: 61 °F

70 °F/50 °F 71 °F/49 °F 54 °F/54 °F

Bayside High School

1901 Degroodt Rd., SW, Palm Bay, FL 32908 , USA Operating since:





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Accomplishments Jobs



- 25 Electricians/companies employed
- 5 Solar companies
- Subcontractors fencing, underground locating, metal work, tree relocating, etc.
- Ex-Kennedy Space Center workers trained through Southeast Solar Training Network helped install several of the E-Shelter systems





SunSmart E-Shelter Program Today



- 117 PV 10 kW with Battery Backup Systems
- 12 Teacher Workshops and 2 Facility Manager Webinars
- Over 450 Teachers & Facilities Managers Educated
- Approximately 30,000 students educated about photovoltaic technology
- Over a Megawatt of capacity





Solar on 117 Florida Shelter/Schools

Collaboration with schools, solar contractors, and electric utilities statewide.







Manager Training



Teacher Workshops











Educational Materials



Middle School Solar Kit





Student Education & Public Outreach



Apollo Elementary Solar Days Brevard County





EnergyWhiz Olympics At FSEC





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PV System Dedication Ceremonies



Key West High School, Key West



Haines City High School, Polk County







Lessons Learned

- Educating stakeholders and decisionmakers should be done before any construction begins
- Effective communication is vital
- Each school may have their own rules





Where Do We Go From Here?

- Complete additional Sunsmart E-Shelter Schools with funding from Duke Energy & TECO
- Refine solar curriculum (Standards)
- Provide more professional development for teachers AND facilities managers
- Develop Sunsmart E-Shelter courses for emergency managers
- Fine tune data collection











www.energywhiz.com or 321-252-9479 or SunSmart@fsec.ucf.edu



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RESILIENT POWER PROJECTS

A.F. Mensah, Inc.

Solar + Storage: Commercial Projects



Operation Highlights:

- Whenever the sun shines, the Solar system generates cheaper and cleaner electricity for the Site. Some of that electricity is stored in the Battery to be sold at higher electricity prices.
- As electricity prices peak over the course of the day, the battery will discharge to monetize some of the stored solar generation
- 1. When there is a power outage, the Battery will work in tandem with the Solar System to provide backup power to the site
- 1. The Battery therefore introduces additional revenue streams beyond those traditionally enjoyed by Solar-only systems

Project Development

Process

- Locate site/customer with need for backup power.
- Work with customer to identify critical loads
- We engineer project and install system at no upfront cost to customer
- We offer power purchase agreement to Customer
- We also enjoy additional revenues for operating the battery in PJM electricity market programs (Energy, Capacity, and Ancillary services). These PJM revenues pay for the incremental cost of the Battery.
- When grid outage occurs solar + battery provide backup power to the Customer

Solar + Storage by the Numbers

- Project Cost for 1 MW Solar + Storage project: \$2.5M Net
 - 1 MW solar + storage project costs approximately\$3.5M
 - □ ITC will be \$1M
- Project Revenue for 1 MW Solar + Storage project: \$675,000/yr
 - \$125,000/year through PPA (roughly \$0.10/kWh)
 - **\$200,000** in SREC per year
 - \$350,000 in PJM revenues
- ~4 year pay-back period

Host Site Requirements

- Each site location will be unique in its energy requirements but in general;
 - Commercial battery storage systems (30-100kW) could be located inside or outside
 - Battery Duration can vary from 30min to 2 hours.
- All systems will be turnkey "plug and play" systems that will be installed, operated and maintained by us.
- Host sites will be evaluated on a case by case basis to match the characteristics of the various battery storage systems to the energy requirements of the host site.

Case Study

New Project (School in Southern New Jersey)
500kW Solar + 500kW/250kWh Storage
Scheduled for Completion in Q4-2015

Retrofit Project (School in Central New Jersey)
6MW Existing Solar PV
1MW/500kWh Battery Storage to be added
Scheduled for Completion in Q4-2015

Presenters

Avital Szulc; Product Manager

- Expertise in thermodynamic modeling, electric trading algorithm design & sustainable practices
- Prior experience with Demand Response Operations in Deregulated Markets
- Background in chemical engineering.

Drew Adams; Head of Strategy & Partnership

- Expertise in regulatory and structured financing of solar, storage, distributed generation, and demand response.
- Prior experience in solar deployment, and electricity market operations

Peter Mendonez, Jr; Head of Engineering

- Expertise in smart grid technologies, renewables, storage, energy trading, and utility operations.
- Prior experience as Subject matter expert and project management for development of National Smart Grid Framework Document and Roadmap
- Additional Working Experience in Electric Utility Industry

Upcoming Webinars

- Resilient Cities: Clean Energy to Power Critical Public and Private Facilities, Thursday, April 2, 2-3pm ET <u>http://bit.ly/RPP-Webinar-4-2-15</u>
- Upgrading Distribution Resilience: A DOE-OE Solicitation, Tuesday, April 7, 1:30-3pm ET <u>http://bit.ly/ESTAP-Webinar-4-7-15</u>



Contact Info & Links

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Sign up for the RPP e-Distribution List to get notices of future webinars and the *Resilient Power Project Newsletter*: <u>http://bit.ly/RPPNews-Sign-Up</u>

More information about the Resilient Power Project, its reports, and other information can be found at <u>www.resilient-power.org</u>.



